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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DAVID A. HORSNELL, MATTHEW B. TOMLIN,
AMMAR LECHEHEB, OLIVER J. PRIME,
MICHAEL J. FOX, and CHRISTOPHER M. BATES

Appeal 2008-3386
Application 10/521,686
Technology Center 2800

Decided: September 26, 2008

Before CHARLES F. WARREN, TERRY J. OWENS, and
THOMAS A. WALTZ, *Administrative Patent Judges*.

WALTZ, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants seek review under 35 U.S.C. § 134 from the Examiner's rejection of all of the pending claims 1-4 in the final Office Action, dated February 26, 2007. This Board has jurisdiction under 35 U.S.C. § 6(b).

The present invention is directed to a print head device and method of using the same to print an image. Claims 1 and 3 are illustrative and reproduced below:

1. A print head comprising a rotatable print array comprising a plurality of print valves, a valve control means in communication with the print array, a pulse generating means for generating a regular sequence of pulse signals and means for rotating, in use, the print array to a predetermined rotation;

the valve control means comprising:

one or more data input lines to receive print data;

memory means comprising an array of memory locations to store the received print data, one dimension of the array of memory locations being associated with the plurality of print valves of the rotatable print array and the other dimension of the array of memory locations being associated with a plurality of pre-determined time periods; and

processing means to process the stored print data, wherein the processing means, in use,

(a) processes the print data in accordance with the predetermined rotation of the rotatable print array;

(b) divides the print data into a plurality of sub-elements, each print data sub-element being associated with a respective print valve and a respective pre-determined time period;

(c) writes each print data sub-element to the memory location associated with the respective print valve and the respective pre-determined time period;

(d) sequentially reads one or more print data sub-elements from the memory locations associated with one pre-determined time period;

(e) activates the respective print valves associated with the one or more print data subelements read in step (d);

characterised in that step (d) is repeated for a subsequent pre-determined time period for each pulse generated by the pulse generating means.

3. A method of printing an image with a print head comprising a rotatable print array comprising a plurality of print valves, the method comprising the steps of:

(a) rotating the print head to a predetermined rotation;

(b) generating a regular sequence of pulse signals;

(c) generating a raster signal representing the image to be printed;

(d) dividing the raster signal into a plurality of sub-elements;

(e) writing each raster signal sub-element into memory means comprising an array of memory locations to store the received print data, one dimension of the array of memory locations being associated with the plurality of print valves of the rotatable print array and the other dimension of the array of memory locations being associated with a plurality of predetermined time periods;

(f) sequentially reading each raster signal sub-element from the memory locations associated with one pre-determined time period; and

(g) activating the respective print valves associated with each raster signal sub-element read in step (f);

characterized in that step (f) is repeated for a subsequent pre-determined time period for each pulse generated by the pulse generating means.

The Examiner cites the following prior art references as evidence of unpatentability of the pending claims:

Slomianny	GB 2134045 A	Aug. 8, 1984
Peer	US 4,567,670	Jan. 28, 1986

Appellants seek review of the following rejection of all pending claims:

1. Claims 1-4 stand rejected under 35 U.S.C. § 103(a) as obvious over Slomianny in view of Peer.

ISSUES ON APPEAL

In their request for review, Appellants identify the following issues of fact and law related to the Examiner's rejections:

1. Does Peer teach the limitation of "sequentially reading one or more print data sub-elements from the memory locations associated with one pre-determined time period?"
2. Does Peer teach repeating the sequential reading step, above, for a subsequent pre-determined time period for each pulse generated by the pulse generating means?
3. Is Appellants' claimed invention, as a whole, obvious over the teachings of Slomianny and Peer?

We determine that the dispositive issue is whether Appellants have established that the Examiner committed reversible error in combining the teachings of Slomianny and Peer to render obvious all of the limitations of the claims on appeal.

FINDINGS OF FACT (“FF”)

The following findings of fact are supported by substantial evidence in the record. Additional findings of fact as necessary appear in the Discussion section of this opinion.

1. Slomianny discloses a method and apparatus including a print head with a rotatable print array, comprising a plurality of print valves, a valve control means in communication with the print array, a pulse generating means, in use generating a regular sequence of pulse signals and means for rotating, in use, the print array to a predetermined rotation. P. 1, ll. 1-14 and ll. 48-64, *see*, Figs. 5 and 6. The valve control means comprises one or more data input lines to receive print data, memory means comprising an array of memory locations to store the received print data, an array of memory locations being associated with the plurality of print valves (jet orifices) of the rotatable print array and the other dimension of the array of memory locations being associated with a plurality of pre-determined time periods. P. 2, ll. 71-80. The invention further comprises processing the print data in accordance with the predetermined rotation of the rotatable print array. P. 1, ll. 48-64.

2. Peer discloses a logic network and method for processing columns of vertically oriented imaging data bits used for operating a slanted print head, including writing byte segments into memory, skewing the image data in memory and reading out the skewed data from memory for operating the print elements to print the image data under the print head during a given print cycle. Abstract.

3. Peer discloses an assembly to perform the method of reading, skewing and outputting image data to a print head, comprising four input

latches 65-68, an input data bus 69, a random access memory (RAM) 81 connected to the input latches, and eight output latches 93-100 connected to the RAM. Col. 5, ll. 39-48. Also included is a drive pulse generator 102. The drive pulse generator is triggered by a fire pulse received from a data processor. Col. 8, ll. 35-38. *See*, Fig. 5.

4. Peer discloses a method of using the above assembly for printing image data, wherein, first, at the start of each line of printing, the input latches of memory and RAM¹ are cleared, or “zeroed.” Then, a cycle is repeated for each line of printing. During each cycle, one column of data, comprising 4 bytes of image data, is printed. Col. 7, ll. 11-17. Each cycle begins with reading the four bytes of image data into the input latches. The data is then transferred to RAM, where the data is skewed, necessary for accommodating the inclined print head. The skewed data is then transferred to the output latches. During skewing and transfer to the output latches, each byte is divided into two equal half-bytes. Upon receipt of a timing signal from the drive pulse generator, triggered by the fire pulse, the data in the eight bytes of the output latch are transferred to the final output latch, and printed by the print head. Col. 6, ll. 5-30. The print loop is then repeated for each subsequent column of image data of the current print line. Col. 6, ll. 14-21. *See*, Fig. 6.

PRINCIPLES OF LAW

“Section 103 forbids issuance of a patent when ‘the differences between the subject matter sought to be patented and the prior art are such

¹ RAM stands for Random Access Memory.

that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1734 (2007)

The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of ordinary skill in the art, and (4) where in evidence, so-called secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966)

When a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield predictable results to be patentable under 35 U.S.C. § 103(a). *KSR Int’l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1740.

If a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. *Id.*

DISCUSSION

Pending claims 1- 4 are subject to a single rejection under 35 U.S.C. § 103(a) as unpatentable over Slomianny in view of Peer. Appellants do not argue the claims separately, but rather address two issues related to the Examiner’s findings of the prior art disclosure and the subsequent obviousness as applied to all claims. *See* App. Br. 6-16. Therefore, we elect

to treat the claims as a group, to stand or fall together, with claim 1 as representative. 37 C.F.R. § 41.37(c)(1)(vii).

Appellants dispute whether the prior art teaches two of the limitations in claim 1. App. Br. 6-13. Otherwise, Appellants have not contested the teachings of the prior art regarding the remaining limitations. We have reviewed the Examiner's findings as to the remaining limitations, and agree with them. Ans. 3-4, FF 1. Appellants also dispute the obviousness of the combination of the disclosures of the two references. App. Br. 13-15. These arguments are addressed below.

Disclosure of Limitations

Appellants contend the following limitations of claim 1 are not found in the prior art references:

(d) sequentially reads one or more print data sub-elements from the memory locations associated with one pre-determined time period;

* * *

characterized in that step (d) is repeated for a subsequent pre-determined time period for each pulse generated by the pulse generating means.

App. Br. 6 [emphasis in original].

In the Final Office Action, the Examiner acknowledges the primary reference, Slomianny, does not teach these limitation, but argues that they are found in the secondary reference to Peer. Ans. 4-5. In their Appeal Brief, Appellants dispute that Peer teaches, “sequentially reads one or more print data sub-elements from the memory locations associated with one pre-determined time period” [hereinafter referred to as “step (d)”], and that it

teaches repeating step d for a subsequent pre-determined time period for each pulse generated by the pulse generator means. App. Br. 6-13.

In their arguments, Appellants separately analyze the excerpts of Peer referenced by the Examiner in support of the rejection. *See* App. Br. 7-10. Appellants then characterize the teaching of each passage, such as, “[t]his passage of Peer merely discloses that the input latch means receives vertical columns of imaging input data bits and divides each column into byte column segments;” App. Br. 7, referring to Peer, col. 1, l. 65 – col. 2, l. 13, or “[t]his passage of Peer merely discloses that the RAM and the input latches are zeroed in order to prepare for receiving new columns of vertical imaging data bits;” App. Br. 9, referring to Peer, col. 6, ll. 5-14, or, in a conclusory manner, “there is nothing in Figure 6 of Peer that teaches or suggests [step (d)] or [repeating step (d) for subsequent time period for each pulse]. App. Br. 11.

However, after fully reviewing Appellants’ arguments, we determine that they have both mischaracterized the teachings of each passage and failed to consider the teachings of the prior art as a whole.

The disclosures of the passages at issue are summarized in Fig. 6 of Peer, which is reproduced below:

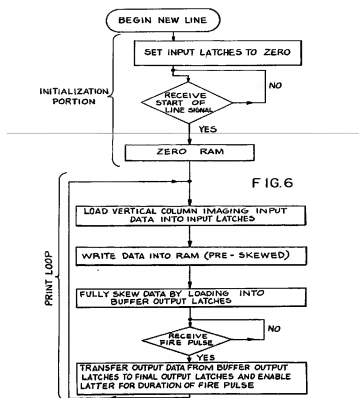


Fig. 6 displays a “print loop”, in which a column of image data is received in the latch inputs, then transferred to RAM and processed (i.e., “skewed,” see col. 7, ll. 14 – 23). The skewed data is then transferred to latch outputs, which are then ready to print. Of relevance to the present issues is that the inputs and outputs are latched memory. As understood by one skilled in the art, a latch is “An electronic circuit that reverses and maintains its state each time that power is applied.”²

As explained in Peer, at the start of each line of printing, after the input latches of memory and RAM are cleared, or “zeroed”, each column of image data to be printed is latched and written into RAM. Each column of image data comprises four 8-bit bytes. The 4 bytes of image data are then

² McGraw-Hill Dictionary of Scientific and Technical Terms 1113 (5th ed., Sybil P. Parker, ed., New York, McGraw-Hill, Inc. 1994).

skewed and written to the output latches. In response to a subsequent fire signal applied to a drive pulse generator, the latched output data is transferred to the final output latch, and then printed. *See*, FF 2-4.

Expressed in terms of the present application, Peer teaches a print loop in which one or more (4) print data sub-elements (bytes of image data) are read from memory locations (input latches and/or RAM) associated with one pre-determined time period (time for the fire pulse to trigger the drive pulse generator). Thus, step (d) is disclosed in Peer.

As indicated in Fig. 6, this process of inputting 4 bytes of image data, skewing the data and outputting the skewed data to the final output latch is repeated for each column of image data across the line of print. Thus, Peer discloses step (d) is repeated, for each pulse of the fire signal. The period of the fire signal is pre-determined by the programming of the data processor. Thus, step (d) is repeated for a subsequent pre-determined time period for each pulse generated by the pulse generating means. FF 4. Accordingly, we determine, as a finding of fact supported by substantial evidence, that Peer discloses the contested limitations.

Obviousness of the Combination

Appellants then contend that the Examiner failed to provide any reason for finding one of ordinary skill in the art would find the claimed invention obvious over Slomianny in view of Peer at the time of the invention. App. Br. 14. The Examiner contends that Peer provides a reason, in that it discloses that slanted or inclined print heads are complex, having a high data count and complicated data handling. Peer provides a data converter system for a slanted or inclined print head, such as that of Appellants, having a low component count and short processing time. Ans.

9. As such, Peer provides the known technique to improve the apparatus disclosed in Slomianny in the same way. Implementing such an improvement would not be beyond one skilled in the art, as we find the Peer to be one of ordinary skill in that art. Thus, we determine the invention of claim 1 to be an obvious improvement upon Slomianny by Peer. *KSR*, 127 S.Ct. at 1740.

Accordingly, we determine that the Appellants have failed to show the Examiner has reversibly erred, and the rejection of the Examiner is affirmed.

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

PL initials:
sld

Appeal 2008-3386
Application 10/521,686

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